PB89-153738

Superfund Record of Decision (EPA Region 6)
Dixie Oil Processors Site, Harris County
Texas, March 1988. First Remedial Action

(U.S.) Environmental Protection Agency
Washington, DC

31 Mar 88

U.S. Department of Commerce
National Technical Information Service
NTIS

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R06-88/032
March 1988

PB89-153738

EPA

Superfund Record of Decision:

Dixie Oil, TX

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 26.6-acre Dixie Oil Processors (DOP) site is located in Harris County, Texas, approximately 20 miles southeast of Houston. The site is broken into two parcels, 19-acre DOP North and 7.6-acre DOP South, separated by Dixie Farm Road. The site is bordered by Mud Gully, a flood control ditch that flows into Clear Creek, Friendswood Oil Field, the Brio Oil Refining NPL site, and various athletic fields. Between 1969 and 1978, the DOP North parcel operated as a copper recovery and hydrocarbon washing facility. Six surface impoundments were used to store copper wastewater and wastewater from the hydrocarbon washing operation prior to recovery and treatment. In 1977 the impoundments were closed and decommissioned and the property sold to DOP. In 1978, DOP began operations on the South parcel of the site. These activities included the following: regeneration of cuprous chloride catalyst; hydrocarbon washing to produce ethylbenzene, toluene, aromatic solvents and styrene pitch; oil recovery; and blending and distilling chemical residues to produce fuel oil, creosote extender and molybdenum concentrate catalyst. The North parcel was not used in these operations. All site activities ceased in 1986. Wastes were disposed of onsite in tanks, drums, and waste pits. Sampling indicates contamination of surface and subsurface soils and shallow

(See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision
Dixie Oil, TX
First Remedial Action
Contaminated Media: gw, soil
Key Contaminants: copper, organics, VOCs

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 79
	20. Security Class (This Page) None	22. Price

16. ABSTRACT (continued)

ground water. The primary contaminants of concern affecting soil and ground water are ethylbenzene, hexachlorobenzene, copper, 1,1,2-trichloroethane and methylene chloride.

The selected remedial action for the Dixie Oil Processors site is a limited action alternative consisting of: site controls including, but not limited to, fencing and deed restrictions to prevent site access; excavation and removal of contaminated offsite soils to background levels, the extent of removal to be determined during remedial design; consolidation and disposal of onsite debris and rubble, disposal method to be determined during design; remediation of Mud Gully, details to be determined during design; operation of the existing wastewater treatment system during implementation of remedial action, then dismantling and removal upon completion; removal and disposal of tank contents and drums, and dismantling, decontamination, and either selling or offsite disposal of tanks; dismantling and disposal of all process equipment; ambient air sampling; control of air emissions from treatment processes, if necessary; sampling and monitoring of Mud Gully sediments and ground water to determine effectiveness of remedy; and regrading and vegetation of the entire DOP site. The estimated present worth costs of this remedy is $241,000.

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DIXIE OIL PROCESSORS
RECORD OF DECISION
MARCH 31, 1988

i.c

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
ALLIED BANK TOWER AT FOUNTAIN PLACE
1445 ROSS AVENUE
DALLAS, TEXAS 75202

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Dixie Oil Processors Site, Harris County, Texas

STATEMENT OF PURPOSE

This decision document outlines the selected remedial action for the Dixie Oil Processors site in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan, 40 CFR Part 300, November 20, 1985.

The State of Texas (through the Texas Water Commission) has been provided an opportunity to comment on the technology and degree of treatment proposed by the Record of Decision and has no objection to the selected remedy (See Appendix F).

STATEMENT OF BASIS

This decision is based on the administrative record for the Brio Refining site (See Appendix D). The attached index identifies the items which comprise the administrative record.

DESCRIPTION OF THE REMEDY

Upon review of the information contained in the administrative record, it is EPA's judgement that limited action and monitoring as described in the No Action alternative of the Brio Refining/Dixie Oil Processors Feasibility Study appears to best serve both statutory and selection criteria in relation to the other solutions evaluated. A detailed description of this remedy and an explanation of how it meets statutory requirements is contained in the attached "Summary of Remedial Alternative Selection."

1.d

This action would include:

Affected materials and soils - The Brio/DOP Endangerment Assessment identified action levels based on limited exposure to site contaminants. This exposure scenario relied heavily on the use of site controls to ensure a limited probability of exposure to these contaminants. The term site controls shall be defined below, but shall include restricted access through the use of a site security fence. The endangerment assessment did not identify any contaminated soils on the DOP site that exceed the action levels discussed above. Therefore, excavation and treatment of contaminated soils is not necessary as long as the site controls are enforced. However, if proper site controls are not ensured and greater exposure results from any future activities, then the action levels identified above no longer would apply and treatment of contaminated soils may be necessary.

Surface contamination - The site investigations identified surface staining throughout the DOP property. These areas will be addressed in the site management plan discussed below.

Off-site soil contamination - Any off-site soil contamination found during the remedial investigation or during the excavation of affected materials and soils shall be removed to background levels. This may require that special detection limits be used for sampling efforts at the site boundaries during the remedial action. This activity will have to be further defined in the remedial design.

Debris and rubble - There is much inert debris and rubble remaining on the site from past operations. This material may be consolidated and the ultimate disposition of the material determined during the remedial design.

Mud Gully - Contaminants observed in this flood control ditch and the "bottle neck" that exists as it passes the Brio and DOP sites has been a noted concern of the EPA as well as local residents and the Harris County Flood Control District. It is apparent that these problems will have to be corrected as part of any remedy that is instituted at the site. Initial thoughts would suggest a low-maintenance approach to resolving this problem where some type of performance standard would be set in cooperation with the Harris County Flood Control District. Such actions shall be further defined in the remedial design.

Wastewater treatment system - The existing wastewater treatment system may be used during remedial action but will be dismantled and removed from the site by the completion of remedial action.

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Storage tanks and drums - Remove tank contents, decontaminate tanks, dismantle tanks; sell or transport dismantled tanks to an EPA approved disposal facility; transport tank contents and drums to an EPA approved off-site disposal facility. If tanks are used during remedial activities, they will be dismantled upon completion.

Process equipment - The entire process facility will be dismantled to the extent that some of the existing facility may be used during remedial activities. If they are used during remedial action, the structures will be dismantled upon completion of these activities.

Monitoring and control of migration pathways - Ambient air sampling on a semi-annual basis; control air emissions from treatment processes (if necessary); excavate in enclosures (if necessary) and vent the enclosure to an emission control device; eliminate or control rainfall on construction areas; sample and monitor Mud Gully sediments; monitor the groundwater in the Numerous Sand Channel Zone and Fifty-Foot Sand for a timeframe to be defined in the remedial design; and monitoring activities will be utilized to determine the effectiveness of the actions to be implemented and shall be detailed in the operation and maintenance plan of the remedial design. This same data will be evaluated during the Agency's 5-year review, in accordance with SARA Section 121(c), to determine if any corrective action is necessary.

Site management plan - The entire DOP site will be regraded and vegetated to promote drainage and minimize infiltration. All regraded areas will be covered with 6 inches of topsoil, if necessary, to promote vegetative growth. To the maximum extent practicable, the aesthetics of the site (upon completion of the remedy) shall be enhanced by utilizing creative design and landscaping techniques with input from the local residents.

Site control - This remedial action is based on permanent site control, imposition of necessary deed notices and restrictions (if possible), and restriction of access to the site by use of a fence or similar barrier.

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DECLARATION

The remedy described above is protective of human health and the environment, attains Federal and State requirements applicable or relevant and appropriate and is cost-effective compared to equally protective alternatives. This remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume; and uses permanent solutions and alternative technologies to the maximum extent practicable.

3/31/88
Date

Robert E. Layton Jr., P.E.,

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

DIXIE OIL PROCESSORS SITE

SOUTHEAST HARRIS COUNTY, TEXAS

MARCH 31, 1988

i.h

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1.0 SITE LOCATION AND DESCRIPTION

The Dixie Oil Processors (DOP) site is located approximately 20 miles southeast of Houston, Texas in Harris County (Figure 1). The site occupies approximately 26.6 acres. Portions of the site occur both north and south of Dixie Farm Road and are designated as DOP North and DOP South. DOP North covers 19.0 acres and DOP South covers 7.6 acres.

Mud Gully, a flood control ditch and local tributary of Clear Creek, runs along the eastern boundary of DOP North and the western boundary of DOP South. The Brio Refinery site borders DOP to the northeast and an athletic field borders DOP North to the Southwest. The Friendswood Oil Field borders the remaining areas (Figure 2).

1.1 SITE HISTORY

Intercoastal Chemical Company (ICC) operated a copper recovery and hydrocarbon washing facility on the DOP North site from 1969 to 1978. A total of six surface impoundments were used by ICC to store wastewater containing copper prior to recovery and to treat wastewater prior to discharge. Wastewaters from the hydrocarbon washing operations were also discharged into one of the impoundments. During a two year period between 1975 and 1977, the impoundments were closed and decommissioned.

In 1978, DOP began operations on the DOP South site. Activities which occurred on the site are as follows:

- Regeneration of cuprous chloride catalyst;
- hydrocarbon washing to produce ethylbenzene, toluene, aromatic solvents, styrene pitch;
- oil recovery; and
- blending and distilling residues from local chemical plants and refineries (mainly phenolic tank bottom tars and glycol cutter stock) to produce various petroleum products including fuel oil, creosote extender, and a molybdenum concentrate catalyst.

Active operations on the DOP site stopped in 1986. Previously closed surface impoundments located on DOP North were not utilized during DOP operations.

1.2 SITE GEOLOGY

The Dixie Oil Processors site is located within the Pleistocene Deltaic Plain of the Brazos River, known as the Alameda Delta. The site is underlain with Pleistocene and Pliocene deposits to a depth of approximately 2400.0 feet as shown on Figure 3. The

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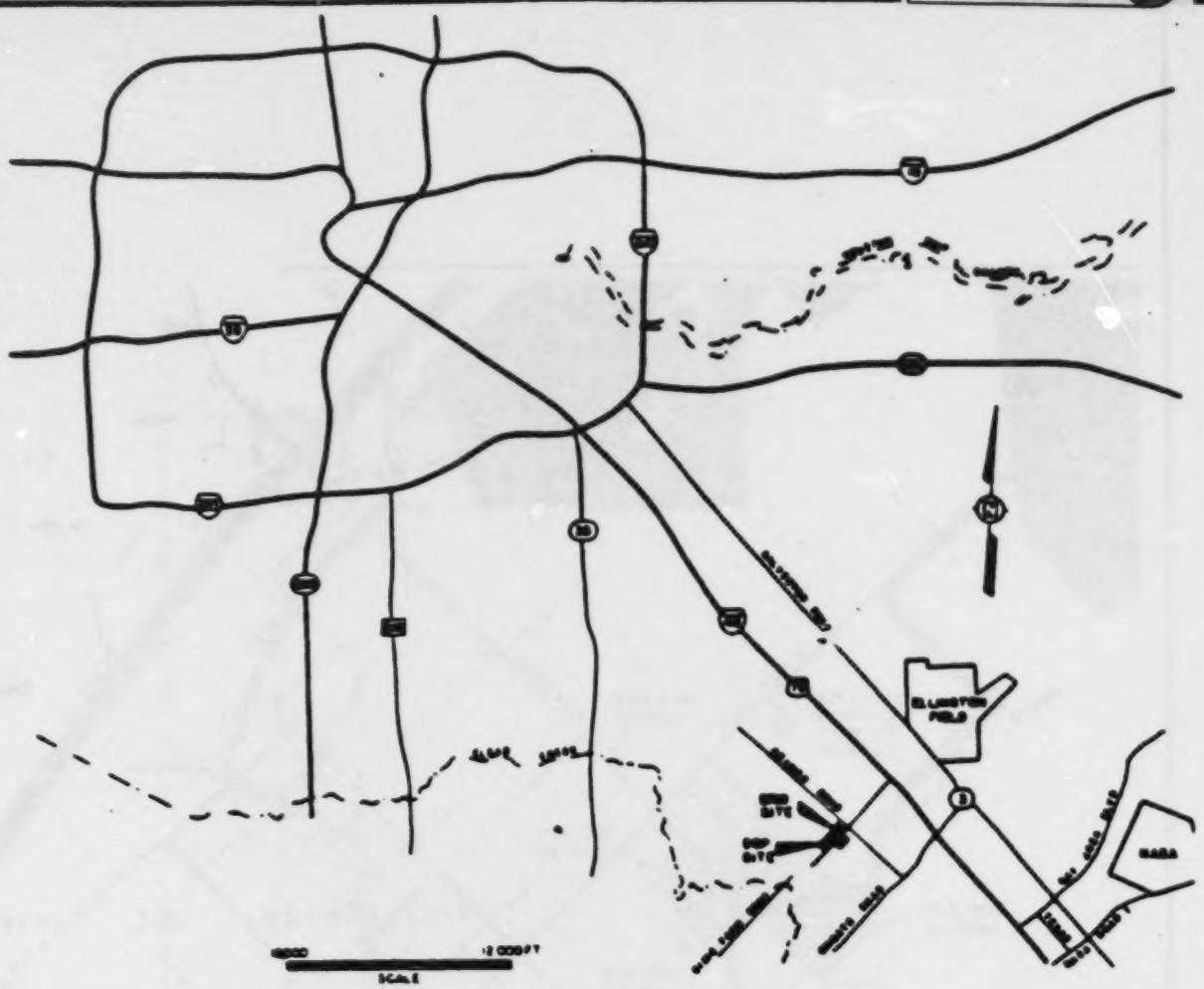
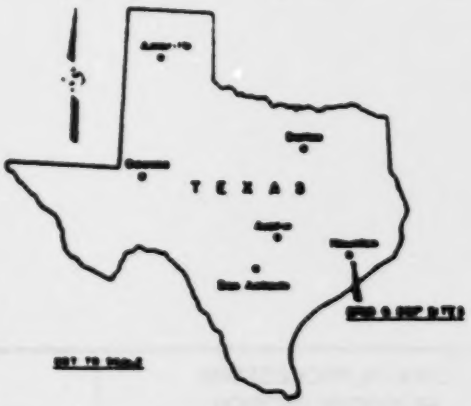


VICINITY MAP



LOCATION MAP

NOTE: INFORMATION OBTAINED FROM THE IT CORPORATION SUMMARY REPORT

DIXIE OIL PROCESSORS RECORD OF DECISION		
SITE LOCATION MAP		
PROJECT NO. TC3621-22	DATE 2-18-88	FIGURE NO. 1

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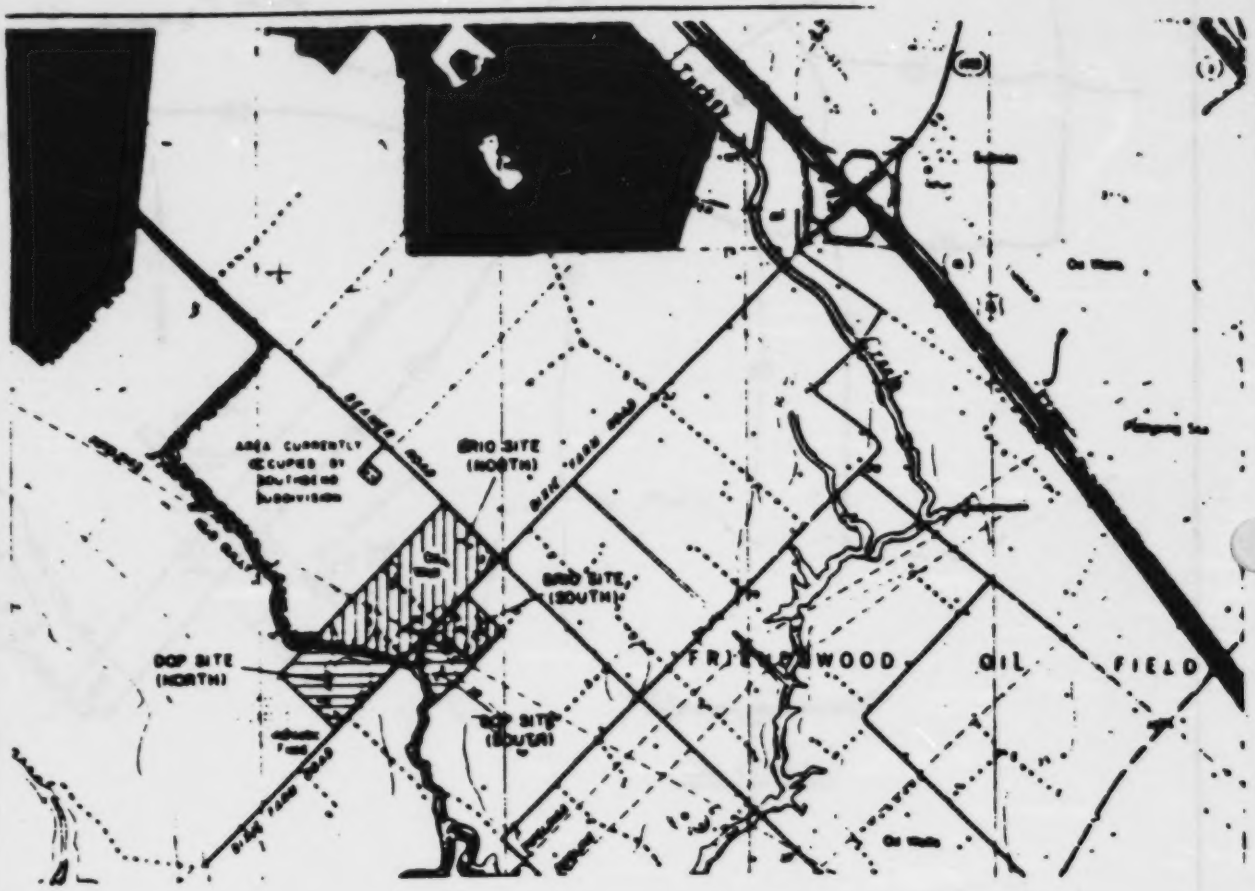
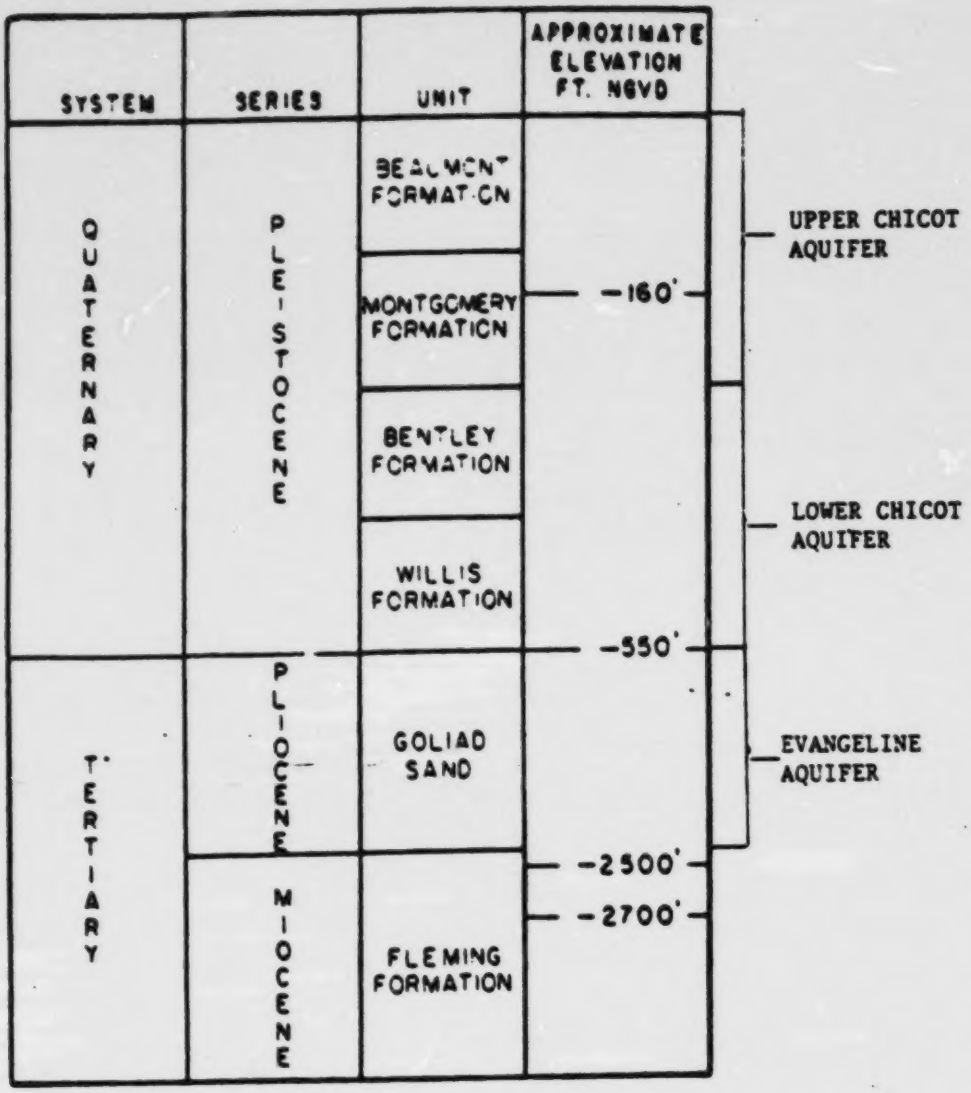


NOTE. INFORMATION OBTAINED FROM THE IT CORPORATION SUMMARY REPORT

DIXIE OIL PROCESSORS RECORD OF DECISION		
SITE LOCATION MAP		
PROJECT NO. TC3621-22	DATE 2-18-88	FIGURE NO. 2



NOTES:

1. DRAWING NOT TO SCALE.
2. MODIFIED FROM GABRYSCH, 1980
3. NGVD REFERS TO NATIONAL GEODETIC VERTICAL DATUM.

NOTE. INFORMATION OBTAINED FROM THE IT CORPORATION SUMMARY REPORT

DIXIE OIL PROCESSORS RECORD OF DECISION		
GENERALIZED STRATIGRAPHIC COLUMN		
PROJECT NO. TC3621-22	DATE 2-18-88	FIGURE NO. 3

aquifers used to supply water for domestic, industrial and agricultural purposes are the Lower Chicot and Evangeline, which are confined aquifers isolated from surface recharge. The groundwater flow in the Lower Chicot and the Evangeline is to the southeast.

The Friendswood Oil Field borders the site and is an extensively explored oil and gas field. The Oligocene Age Brio Formation of the Texas Gulf Coast Region is the oil producing zone with wells from 4000.0 to 7000.0 feet deep.

The site specific geology that was under investigation during the Remedial Investigation/Feasibility Study (RI/FS) was the Beaumont Formation as shown in Figure 4. The results from the Feasibility Study and Summary Report are given in the following paragraphs.

The Beaumont Formation is separated into five major units (Figure 4). The Upper Clay Unit is composed of clay and silty clay. The unit is continuous across the site and ranges in depth from 14.0 to 32.0 feet. The Numerous Sand Channels Zone (NSCZ) is the next unit and is comprised of interbedded sands, sandy silts, silty sands, clayey silts and silty clays. The thickness of the NSCZ varies across the site from 3.8 to 26.6 feet. The NSCZ is the upper water bearing unit with well yields less than 10 gpm. The Middle Clay Unit is next and is composed of silty clay/clayey silt. The thickness ranges from 8.0 to 20.0 feet. The Middle Clay separates the NSCZ from the lower aquifer and forms a confining layer over the lower unit. The Fifty-Foot Sand is the fourth unit and occurs between 52.0 and 61.5 feet below ground surface. The thickness varies from 35.0 to 45.0 feet. The Fifty-Foot Sand Unit has reasonably high well yield. The fifth and last unit is the Lower Clay Unit, a silty clay approximately 100.0 to 120.0 feet thick. The unit extends to at least 200.0 feet below ground surface.

A salt dome fault is located in the western part of the DOP site. According to Dr. Carl Norman of the University of Houston, the ground movement north of the fault has been downward in relation to the ground south of the fault. The fault could cause a slight reduction in lateral groundwater flow for various units across the fault. At this time, there is no evidence to support a vertical hydraulic connection between the units along the fault.

1.3 SITE HYDROGEOLOGY

The NSCZ and the Fifty-Foot Sand are the two water bearing units investigated at the DOP site. The NSCZ potentiometric surface indicates that the groundwater flow is towards Mud Gully and will either run parallel to the gully or discharge into the gully. The groundwater flow volumes range from 6.6 to 102.0 gallons per year per square foot of cross-sectional area. The velocity of the groundwater ranged from 2.9 to 68.0 feet per year.

LITHOSTRATIGRAPHIC UNITS			SITE LITHOLOGIC UNITS	SITE HYDROLOGIC UNITS
BEAUMONT FORMATION	UPPER MEMBER	EUNICE MEMBER	UPPER CLAY UNIT	SEMI-CONFINING LAYER
			NUMEROUS SAND CHANNELS ZONE (NSCZ	UPPER WATER-BEARING ZONE
	LOWER MEMBER	OBERLIN MEMBER	MIDDLE CLAY UNIT	AQUITARD
			FIFTY-FOOT SAND ZONE	LOWER WATER-BEARING ZONE
LISSIE FORMATION			LOWER CLAY UNIT	AQUITARD

NOTE: INFORMATION OBTAINED FROM THE IT CORPORATION SUMMARY REPORT

DIXIE OIL PROCESSORS RECORD OF DECISION		
SITE LITHOLOGIC UNITS		
PROJECT NO. TC3621-22	DATE 2-18-88	FIGURE NO. 4

The potentiometric surface of the Fifty-Foot Sand showed a hydraulic gradient of 0.0001 in the south-southeast direction. Flow would be towards the Gulf Coast. Lateral groundwater flow volumes range from 1.2 to 12.0 gallons per year per sq. ft. of cross sectional area. The average groundwater velocities were 3.9 to 58.0 feet per year.

The Middle Clay Unit has an upward hydraulic gradient thereby minimizing the potential for groundwater movement between the NSCZ and the Fifty-Foot Sand over most of the site.

1.4 REMEDIAL AND SUPPLEMENTAL REMEDIAL INVESTIGATION RESULTS

Three different types of wastes were sampled at the Dixie Oil Processors Superfund Site. The three were the contents of the drums, tanks and vessels onsite, surface and subsurface soils associated with the on-site waste pits, and contaminated groundwater.

Various sludges and liquids are stored in vessels and tanks on the site (See Appendix B for vessel inventory). All the tanks are within earthen or concrete berms. Drums containing drilling spoils, created during the Remedial and Supplemental Remedial Investigations have been staged on the Brio site.

The major sources of contamination on the site are the closed impoundments (pits) and the contamination to the shallowest aquifer these pits may have caused.

There are approximately 107,351 cubic yards of contaminated soils and subsoils on the site, associated with six different pits. The pits are identified as AA to EE (See Figure 5). Numerous discrete interval and composite samples were collected from each pit and the subsurface soil around each pit. The analyses of these samples indicates that the pits are sources of groundwater contamination. Table 1 shows the compounds with the highest concentrations detected in the pit and subsoil samples.

For the pit samples, ethylbenzene had the highest concentration (6.40 mg/kg) of volatile organic compounds; hexachlorobenzene had the highest concentration (674 mg/kg) of base neutral organic compounds; and copper had the highest concentration (72,860 mg/kg) of inorganic compounds. No organic compounds were found in any subsoil samples.

Ten wells were installed in the shallowest aquifer (known as the NSCZ) to test for contamination, and four more were drilled into the next aquifer (known as the Fifty-Foot Sand aquifer). Table 2 shows the highest concentrations of organic contaminants detected in the groundwater samples from the site.

In the groundwater samples of the NSCZ, 1,1,2-trichloroethane had the highest concentration (16.4 mg/kg) of organic compounds and

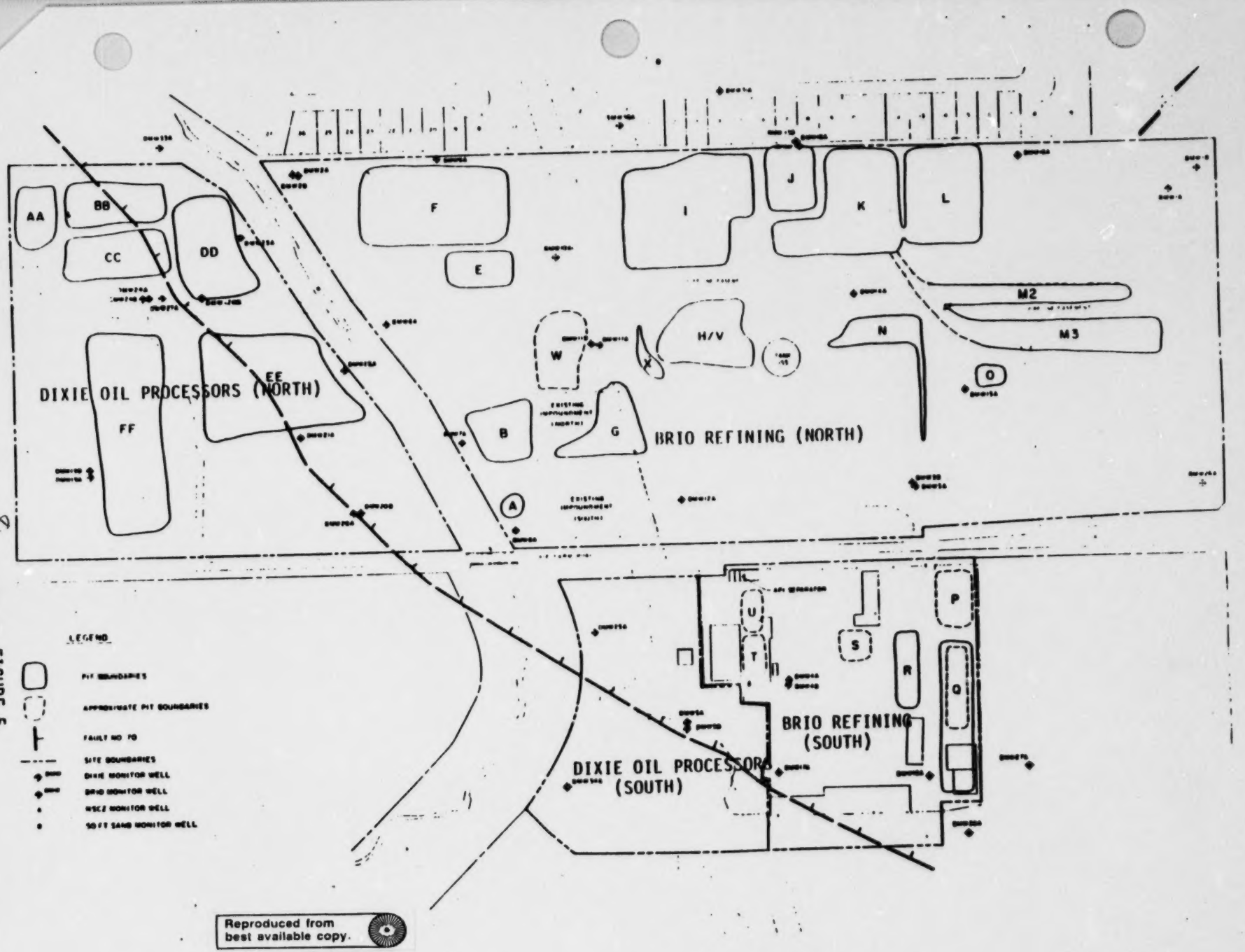


FIGURE 5

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TABLE 1

HIGHEST COMPOUND CONCENTRATIONS FOR PIT AND SOIL SAMPLES

	Highest Concentration Volatile Organic Compounds (mg/kg)			Highest Concentration Base Neutral Organic Compounds (mg/kg)		
PIT	Compound	Pit	Soil	Compound	Pit	Soil
AA	Methylene Chloride	3.11	ND	Di-n-octyl phthalate	1.45	ND
BB	1,1,2 Trichloro-ethane	3.37	ND	Phenanthrene	9.47	ND
				Hexachlorobenzene	4.97	ND
CC	1,1,2 Trichloro-ethane	0.79	ND	Di-n-octyl phthalate	1.63	ND
DD	None Detected			Phenanthrene	1.10	ND
EE	Ethylhexzene	6.40	ND	Hexachlorobenzene	674	ND
FF	Methylene Chloride	0.2	ND	Di-n-octyl phthalate	5.10	ND

TABLE 2

ORGANIC COMPOUND CONCENTRATIONS IN THE NSCZ

Well	Concentration (mg/l)
DMW 5A	9.5
DMW 19A	ND
DMW 20A	ND
DMW 21A	ND
DMW 22A	0.63
DMW 23A	0.01
DMW 24A	ND
DMW 25A	0.041
DMW33A	0.24
DMW34A	24

DMW = Dixie Monitoring Well

A = Well monitors the NSCZ aquifer.

Concentration is the sum of the concentrations of :

Vinyl Chloride
Dichloroethane
Trichloroethane
Methylene Chloride
Bis (2 chloroethyl) ether

copper had the highest concentration (110 mg/l) of inorganic compounds. No contamination was detected in the groundwater from the Fifty-Foot Sand aquifer. The most frequently detected volatile organic compound in the pit samples was methylene chloride. Phenanthrene was the most frequently detected base neutral organic compound found in the pit samples. Copper was the most common inorganic compound found in the pit samples.

1.5 POTENTIAL IMPACTS OF THE SITE ON HUMAN HEALTH AND THE ENVIRONMENT

The assessment of risk posed by the Dixie Oil Processors site was evaluated in the Brio Refining/Dixie Oil Processors Endangerment Assessment. This assessment examined the amount, concentration, properties, and environmental fate and transport of chemical found at the site; the populations and environments potentially at risk; exposure pathways; and potential exposure events.

EPA has concluded that the site potentially poses four major risks to human health and the environment. These risks would result from:

- Ingestion of on-site soils;
- direct contact with on-site soils;
- inhalation of dust from the site; and
- ingestion of shallow groundwater from the site.

However, these risks are only possible should the restrictions to site access and use be violated.

Many of the chemicals found on the site are carcinogens (1,1,2 trichloroethane and methylene chloride) or toxic to the central nervous system, liver, or respiratory system (toluene and chlorobenzene).

The populations identified as being potentially at risk are several subdivisions, including Southbend, a junior college, an elementary school, and a hospital. Each is located within one-half mile of the site. The 1985 population residing within one mile is estimated at 5,751. Approximately 71,000 people reside within a four-mile radius.

Using a trespass exposure scenario, which assumed that the site would remain a secured industrial facility, target removal and treatment levels for selected chemicals were developed. These target levels were based on a 10^{-6} increased cancer risk for carcinogens and on an acceptable chronic daily intake for non-carcinogens. The endangerment assessment also examined an unrestricted access exposure scenario which indicated that greater volumes of affected materials and soil would have to be

treated should exposure to the site increase. Reference the Brio Refining/Dixie Oil Processors Endangerment Assessment for a more detailed discussion and analysis of this subject.

II. ENFORCEMENT

Approximately 17 potentially responsible parties (PRPs) have been identified. To this group, 104(e) information requests were sent, with 2 follow-up letters. EPA received 11 responses (many of the companies identified are no longer in business). The Agency did not send any Notice Letters to these parties.

EPA will continue its enforcement activities and send Special Notice Letters to PRPs prior to the initiation of the remedial design. Should the PRPs decline to conduct future remedial activities, EPA will provide funding for such activities, but will retain its right to seek cost recovery for all EPA-funded response actions from the above referenced PRPs.

III. COMMUNITY RELATIONS

Dixie Oil Processors (DOP) was referred to EPA in 1985 by the Texas Water Commission for inclusion to the National Priorities List. Due to its location next to the Brio Refining site, its past history with the site and the fact that many of the same PRPs at Brio were potentially involved at DOP, the Brio Administrative Order on Consent was amended on April 23, 1986, to include the DOP site. This agreement between EPA and the Brio Site Task Force provided for investigations at the DOP site and for the Task Force to conduct a comprehensive community relations program on DOP with EPA oversight.

On September 4, 1986, a community meeting was held to discuss any issues or concerns the local residents may have regarding the site studies. Status reports were also provided through newsletters.

On February 2, 1987, the Task Force held a community meeting on various treatment techniques that may be employed during remedial action at a typical Superfund site. A community leaders meeting was held on April 2, 1987, to provide an update on site activities. A meeting to discuss the preliminary results of the Endangerment Assessment was held with the community leaders on June 18, 1987.

On January 21, 1988, EPA announced through a press release that studies were completed on the DOP site. The announcement also advised the public that EPA would be accepting comments on the proposed remedy for the site from February 1 to March 1, 1988, and that the Agency would hold a public meeting on February 9, 1988. An EPA prepared fact sheet describing various alternatives evaluated was mailed to interested citizens. EPA held a community leaders meeting on January 25, 1988, to brief the

members of the group on the solutions proposed for the site. On the following night, January 26, 1988, the Brio Site Task Force held a community meeting to discuss the overall results of the site investigations, the findings of the Endangerment Assessment. An EPA representative announced the scheduled public meeting to discuss remedial alternatives. EPA's public meeting was held on February 9, 1988, at the Weber Elementary School. Approximately 350 people attended the meeting. The community expressed great concern that the remedial action would only address partial remediation. A summary of the public response to the solutions proposed by EPA at this meeting, can be found in the Responsiveness Summary (Appendix A). On February 22, EPA met with the Friendswood City Council to discuss the proposed alternative solutions that the Agency had outlined in its public meeting on February 9.

Again, It should be noted that EPA was an active participant in all of the community or community leaders meetings discussed above. These activities were carried-out in cooperation with the Brio Site Task Force in accordance with the terms outlined in the above mentioned Brio Refining/Dixie Oil Processors Administrative Order on Consent.

IV. ALTERNATIVES EVALUATION

4.1 EVALUATION CRITERIA

Section 121 (a), (b), and (d) of the Superfund Amendments and Reauthorization Act (SARA) contains nine factors which EPA must consider in selecting a remedy for a Superfund site. These items are summarized below:

1. Consistency with Other Environmental Laws

   In determining appropriate remedial actions at Superfund sites, consideration must be given to the requirements of other Federal and State environmental laws, in addition to CERCLA, as amended by SARA. Primary consideration is given to attaining applicable or relevant and appropriate Federal and State public health and environmental laws and regulations and standards. Not all Federal and State environmental laws and regulations are applicable to each Superfund response action. The compliance of each remedial alternative with all applicable or relevant and appropriate environmental laws is discussed in Appendix C.

2. Reduction of Toxicity, Mobility or Volume

   The degree to which alternatives employ treatment that reduces toxicity, mobility or volume must be assessed. Relevant factors include:

- o The treatment processes the proposed solutions employed and materials they treat;

- o the amount of contaminated materials that will be destroyed or treated;

- o the degree of expected reduction in toxicity, mobility, or volume;

- o the degree to which the treatment is irreversible; and

- o the residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity for bio-accumulation of such hazardous substances and their constituents.

3. Short-term Effectiveness

The short-term effectiveness of an alternative must be assessed considering the following:

- o Magnitude of reduction of existing risks; and

- o short-term risks that might be posed to the community, workers, or the environment during the implementation of an alternative including potential threats to human health or the environment associated with excavation, transportation, and redisposal or containment.

4. Long-term Effectiveness and Permanence

Alternatives are assessed for the long-term effectiveness and permanence they afford along with the degree of certainty that the remedy will prove successful. Factors considered are:

- o Magnitude of residual risks in terms of amounts and concentrations of wastes remaining following implementation of a remedial action, considering the persistence, toxicity, mobility, and propensity for bio-accumulation of such hazardous substances and their constituents;

- o type and degree of long-term management required, including monitoring and operation and maintenance;

- o potential for exposure of human and environmental receptors to remaining waste considering the potential threat to human health and the environment associated with excavation, transportation, redisposal, or containment;

- o long-term reliability of the engineering and

institutional controls, including uncertainties associated with the land disposal of untreated wastes and residuals; and

- o potential need for replacement of the remedy.

5. Implementability

The ease or difficulty of implementing the alternatives are assessed by considering the following factors:

- o Degree of difficulty associated with constructing the solution;
- o expected operational reliability of the treatment technology;
- o need to coordinate with and obtain necessary approvals and permits (or meet the intent of any permit in the case of Superfund actions);
- o availability of necessary equipment and specialists; and
- o available capacity and location of needed treatment, storage, and disposal services.

6. Costs

The types of costs that should be assessed include the following:

- o Capital costs;
- o operation and maintenance costs;
- o net present value of capital and operation and maintenance cost; and
- o potential future remedial action costs.

7. Community Acceptance

This assessment should evaluate:

- o Components of remedial alternatives that the community supports;
- o features of the alternatives about which the community has reservations; and
- o elements of the alternatives which the community

strongly opposes.

8. State Acceptance (through the Texas Water Commission)

   Evaluation includes assessment of:

   - Components of remedial alternatives that the State supports;
   - features of the alternatives about which the State has reservations; and
   - elements of the alternatives which the State strongly opposes.

9. Overall Protection of Human Health and the Environment

   Following the analysis of the remedial options against individual evaluation criteria, the alternatives are assessed from the standpoint of whether they provide adequate protection of human health and the environment.

   EPA is also directed by Superfund law (SARA) to give preference to solutions that utilize treatment to remove contaminants from the environment. Offsite transport and disposal without treatment is the least preferred option where practicable treatment technologies are available.

4.2 DESCRIPTION OF ALTERNATIVES

In conformance with the National Contingency Plan, initial remedial approaches were screened to determine which might be appropriate for this site (see the Brio refining/Dixie Oil Processors Feasibility Study for details of this evaluation). From these possible remedies, four were chosen for more detailed evaluation and comparison with the remedy selection criteria outlined above. Two other alternatives, No Action and Off-site Disposal, were also evaluated to comply with the requirements of the NCP. Each remedy is summarized below. Common elements of all the plans include:

- Implementing the Site Management Plan. Areas of the site which are not treated would be regraded and revegetated to promote rainwater drainage into Mud Gully and to minimize infiltration.
- Monitoring of the existing wells on the site.
- Monitoring Mud Gully in three locations for any increased contamination in runoff.
- All tank contents will be removed and properly disposed.

- o There will be semi-annual air monitoring of the site.

- o Site controls through the use of the existing security fence and imposing a deed notice and restrictions (if possible).

The Brio/DOP Endangerment Assessment (EA) identified the action levels (or those affected material and soil that required treatment based on a trespass exposure scenario) for each site. This provided the information necessary to determine the volume of affected material and soil requiring treatment. In the case of the Dixie Oil Processors site, there were no affected materials and soils found to exist above the EA action levels. Therefore, each of the alternatives evaluated in the Brio/DOP Feasibility Study assumed that all treatment of affected materials and soils would occur at the Brio site (being the only site with affected materials and soils above the referenced action levels). Furthermore, the costs associated with each of the remedies evaluated below accounts only for the monitoring and site management plan activities that would occur in conjunction with the selected remedy selected for the Brio Refining site (as outlined in the Brio Refining/Dixie Oil Processors Feasibility Study). Examination of the line item costs for both the Brio and Dixie Oil Processors sites may clarify this point (Table 3 - 8).

It must also be noted that the estimated cost of the alternative actions at DOP (listed below) do not include the costs associated with dismantling the process facility. Appendix E contains an the information to support an estimated cost of $100,000 for flushing and dismantling the facility.

Alternative 1: No Action This remedy consists mainly of the common elements listed above. The site management plan will be implemented, all drums on the site properly disposed, and the various monitoring plans initiated. Access to the site would be controlled with the existing security fence. Deed restrictions on the property would be imposed. If any contaminated soils are found to be above the action levels, they will be properly disposed. The estimated cost of this alternative is $141,000 (plus $100,000 to dismantle the facility).

Alternative 2: Cap and Cover Under conditions where affected materials and soils were to exist above the action levels specified in the Brio Refining/Dixie Oil Processors Endangerment Assessment this remedy would consist of three main phases. First, all on-site liquids and flowable organics will be stabilized in place. Any work which might release VOC fumes will be done inside portable buildings connected to a fume incinerator/scrubber. The pits would then be closed by constructing compacted clay caps over them. These caps would

TABLE 3
NO ACTION
REMEDIAL ACTION PLAN
BRIO, DOP LINE ITEM COST
($K)

SOURCES AND PATHWAYS	BRIO COST	DOP COST	TOTAL COST
1. Affected Soils and Material	0	0	0
2. Wastewater Treatment System	310	0	310
3. Storage Tanks and Drums	680	0	680
4. Air Migration	120	20	140
5. Runoff to Mud Gully	0	0	0
6. Mud Gully Sediments	0	0	0
7. Ground water (NSCZ)	600	40	640
8. Ground water (Fifty-Foot Sand)	86	21	107
9. Site Management Plan	1,470	60	1,530
TOTAL COST	3,266	141	3,407
NET PRESENT COST	1,350	80	1,430

VOLUME: 62,000 C.Y.
DURATION: 30 Years
COST BASIS: -30% to +50%

TABLE 4
VAULT
REMEDIAL ACTION PLAN
BRIO, DOP LINE ITEM COST
($K)

SOURCES AND PATHWAYS	BRIO COST	DOP COST	TOTAL COST
1. Affected Soils and Material	12,870	0	12,870
2. Wastewater Treatment System	800	0	800
3. Storage Tanks and Drums	700	0	700
4. Air Migration	2,695	25	2,720
5. Runoff to Mud Gully	0	0	0
6. Mud Gully Sediments	270	0	270
7. Ground water (NSCZ)	1,832	42	1,874
8. Ground water (Fifty-Foot Sand)	86	21	107
9. Site Management Plan	1,470	60	1,530
TOTAL COST	20,723	148	20,871
NET PRESENT COST	17,180	120	17,300

VOLUME: 62,000 C.Y.
DURATION: 3 Years
COST BASIS: -30% to +50%

TABLE 5
CAP AND COVER
REMEDIAL ACTION PLAN
BRIO, DOP LINE ITEM COST
($K)

SOURCES AND PATHWAYS	BRIO COST	DOP COST	TOTAL COST
1. Affected Soils and Material	6,770	0	6,770
2. Wastewater Treatment System	510	0	510
3. Storage Tanks and Drums	620	0	620
4. Air Migration	1,775	25	1,800
5. Runoff to Mud Gully	0	0	0
6. Mud Gully Sediments	270	0	270
7. Ground water (NSCZ)	1,832	42	1,874
8. Ground water (Fifty-Foot Sand)	86	21	107
9. Site Management Plan	1,470	60	1,530
TOTAL COST	13,333	148	13,481
NET PRESENT COST	11,570	130	11,700

VOLUME: 62,000 C.Y.
DURATION: 2 Years
COST BASIS: -30% to +50%

TABLE 6
BIOLOGICAL TREATMENT ACTION PLAN
BRIO, DOP LINE ITEM COST
($K)

SOURCES AND PATHWAYS	BRIO COST	DOP COST	TOTAL COST
1. Affected Soils and Material			
a. Aqueous Phase	14,335	0	14,335
b. Solid Phase	14,360	0	14,360
2. Wastewater Treatment System	1,350	0	1,350
3. Storage Tanks and Drums	770	0	770
4. Air Migration	2,695	25	2,720
5. Runoff to Mud Gully	0	0	0
6. Mud Gully Sediments	270	0	270
7. Ground water (NSCZ)	1,832	42	1,874
8. Ground water (Fifty-Foot Sand)	86	21	107
9. Site Management Plan	1,470	60	1,530
TOTAL COST			
a. Aqueous Phase	22,808	148	22,956
b. Solid Phase	22,833	148	22,981
NET PRESENT COST			
a. Aqueous Phase	19,790	130	19,920
b. Solid Phase	19,800	130	19,930

VOLUME: 62,000 C.Y.
DURATION: 30 Months
COST BASIS: -30% to +50%

TABLE 7
INCINERATION REMEDIAL ACTION PLAN
BRIO, DOP LINE ITEM COST
($K)

SOURCES AND PATHWAYS	BRIO COST	DOP COST	TOTAL COST
1. Affected Soils and Material			
a. Rotary Kiln	19,260	0	19,260
b. Infrared	15,120	0	15,120
2. Wastewater Treatment System	775	25	800
3. Storage Tanks and Drums	700	0	700
4. Air Migration	1,705	25	1,730
5. Runoff to Mud Gully	0	0	0
6. Mud Gully Sediments	270	0	270
7. Ground water (NSCZ)	1,832	42	1,874
8. Ground water (Fifty-Foot Sand)	86	21	107
9. Site Management Plan	1,470	60	1,530
TOTAL COST			
a. Rotary Kiln	26,098	173	26,271
b. Infrared	21,958	173	22,131
NET PRESENT COST			
a. Rotary Kiln	21,640	140	21,780
b. Infrared	17,430	110	17,540

VOLUME: 62,000 C.Y.
DURATION: a. 3 Years
b. 4 Years
COST BASIS: -30% to +50%

TABLE 8
OFF SITE DISPOSAL
REMEDIAL ACTION PLAN
BRIO, DOP LINE ITEM COST
($K)

SOURCES AND PATHWAYS	BRIO COST	DOP COST	TOTAL COST
1. Affected Soils and Material	76,710	0	76,710
2. Wastewater Treatment System	800	0	800
3. Storage Tanks and Drums	700	0	700
4. Air Migration	2,415	25	2,440
5. Runoff to Mud Gully	0	0	0
6. Mud Gully Sediments	270	0	270
7. Ground water (NSCZ)	1,832	42	1,874
8. Ground water (Fifty-Foot Sand)	86	21	107
9. Site Management Plan	1,470	60	1,530
TOTAL COST	84,283	148	84,431
NET PRESENT COST	66,060	130	66,190

VOLUME: 62,000 C.Y.
DURATION: 4 Years
COST BASIS: -30% to +50%

have a venting system to trap any volatile organic compound (VOC) fumes released later by the unstabilized materials (soils) in the pits. The vents will be connected to carbon canisters to control any VOC emissions, if necessary. All drums and tanks will be disposed of off site. The estimated cost of this alternative is $148,000 (plus $100,000 to dismantle the facility).

Alternative 3: Vault Under conditions where affected materials and soils were to exist above the action levels specified in the Brio Refining/Dixie Oil Processors Endangerment Assessment this remedy would place all affected materials in an on-site vault. Affected materials would include drum contents, soil and subsoil contaminated at or above action levels, and any liquids and flowable solids. Any liquids or flowable solids will be stabilized first, and then put in the vault. Any work which might release VOC fumes would be done in a portable building, the fumes collected and incinerated. After the vault was filled it would be capped and covered. As in the Cap and Cover alternative, a venting system for VOC fumes would be installed. Tank liquids and drums with liquids would be disposed of off site. All tanks but one would be dismantled and buried in the vault along with all drums of solids. One tank would be used to equalize the flow to a wastewater treatment plant. This plant would treat the leachate from the vault. The estimated cost of this alternative is $148,000 (plus $100,000 to dismantle the facility).

Alternative 4: Biological Treatment Under conditions where affected materials and soils were to exist above the action levels specified in the Brio Refining/Dixie Oil Processors Endangerment Assessment this remedy would use either a solid phase or aqueous biological system to treat all affected materials and soils. After treatment, the solid residues from either process would be sufficiently decontaminated for use as direct backfill of the areas from which they were removed. All excavation would be enclosed in a portable structure which would vent to a fume incinerator/scrubber system. Tank residues, drums and decontaminated, dismantled tanks would be transported off site and disposed. The estimated cost of this alternative is $148,000 (plus $100,000 to dismantle the facility).

Alternative 5: On Site Incineration Under conditions where affected materials and soils were to exist above the action levels specified in the Brio Refining/Dixie Oil Processors Endangerment Assessment, the only difference between this remedy and Alternative 4 is that the affected materials would be incinerated. The decontaminated ash would be used to backfill the excavations. The estimated cost of this alternative is $173,000 (plus $100,000 to dismantle the facility).

Alternative 6: Off-site Disposal Under conditions where affected materials and soils were to exist above the action levels specified in the Brio Refining/Dixie Oil Processors Endangerment

Assessment this solution would include excavation inside portable buildings connected to a fume incinerator/scrubber. The pits would then be backfilled with clean soil. The excavated material would be placed in trucks, specially equipped for hauling hazardous substances, and transported to an off-site disposal facility. The estimated cost of this alternative is $148,000 (plus $100,000 to dismantle the facility).

4.3 EVALUATION OF ALTERNATIVES

It should be noted, as discussed in Section 4.2 above, that the Brio Refining/Dixie Oil Processors Endangerment Assessment indicated that under a trespass exposure scenario (that assumed use of a site security fence to restrict access, thus limiting potential exposure to site contaminants) there were no affected material and soil above the action levels which would trigger the need for treatment. Therefore, only monitoring activities and the site management plan of each alternative would be applicable to the Dixie Oil Processors site.

The degree to which the remedial alternatives meet the nine selection criteria is contained in Table 9. The following values were assigned to compare remedy selection criteria:

- ++ Alternative would greatly exceed a selection criterion when compared to other alternatives.
- \+ Alternative would exceed a criterion in comparison to other alternatives.
- 0 Alternative can be designed to meet the selection criterion.
- \- Special efforts will be necessary in the design of the remedy to meet the selection criterion.
- -- In comparison to the other remedies, these alternatives would present most difficulty in achieving a selection criterion.

The rationale for the ratings assigned in this table is as follows:

1. Complies with ARARS (i.e. meets or exceeds Applicable, or Relevant and Appropriate Federal and State Requirements).

   All alternatives are assigned a "0" because they can be designed to meet the selection criterion.

2. Reduces: Toxicity, Mobility, and Volume

   All alternatives were rated "-" because they do not reduce any of these parameters. However, they all

are protective of public helath and the environment and provide permanence to the maximum extent practicable.

3. Short-Term Effectiveness

All the alternatives were rated "0", as long as site access is restricted and the potential for direct contact with site contaminants is significantly reduced.

4. Long-Term Effectiveness and Permanence

All alternatives were rated "+" based on the low level of contamination left on the site, the low mobility of the waste and the site controls which will be enforced to reduce potential exposure. All alternatives provide permanence to the maximum extent practicable.

5. Implementability

All alternatives were rated "0" because of the ease in implementing the monitoring activities, a site management plan, and any necessary dismantling.

6. Cost

Estimated costs for each remedial action alternative are summarized in Table 4. Included in this table are total capital and present worth costs. Operation and maintenance costs were factored into each line item. The only foreseen cause for failure of the remedy is a change in the land use which would result an increase in exposure to site contaminants. In this case, further treatment of affected soils and materials may be necessary. If you were to increase exposure to levels which required treatment to background conditions (naturally occurring), it is estimated that in excess of 100,000 cubic yards of soil would have to be treated at a cost of $30 to $40 million.

The No Action alternative has the lowest present worth cost of the various alternatives followed by Biological Treatment, Off-Site Disposal, Cap and Cover, Vault, and Incineration. The line items were essentially the same except for the differing costs associated with air monitoring and the wastewater treatment system. Line item accounting costs include air emissions controls and monitoring, groundwater monitoring and the site management plan.

7. Community Acceptance

Comments from local residents received at the public meeting on February 9, 1988, and during the public comment period have one central theme, there is general agreement among local residents that all measurable amounts of affected materials and soils found on the site should be treated. EPA has proposed to treat only affected materials and soils that would pose a human health or environmental health threat. Thus, some measurable amounts of contaminants will remain on site, however, deed restrictions will be imposed and site access will be controlled. Another major concern of the public is the potential adverse impact that this Superfund site will have on their property values and on the economic development of the area.

Community members have also expressed concern over the need to widen Mud Gully (a flood control ditch located on the western boundary of the site) to prevent a "bottle neck" in the ditch. Additionally, they would like to see the tanks and process equipment dismantled as part of any remedy.

Off-site Disposal was the only solution which the public appeared to favor, but they wanted all contaminants excavated and disposed off-site. Therefore, Off-Site Disposal was rated "+" while all other alternatives evaluated in this Record of Decision were rated "-" due to the lack of support community support.

To address the concerns mentioned above, EPA will request that any settling party (as part of the selected remedy) investigate creative design and landscaping ideas, in cooperation with the local residents, that might reduce any adverse economic impact the site might have on the area and enhance the aesthetics of the site. Additionally, any remedy will have to address the problem associated with Mud Gully to the satisfaction of the local Flood Control District and include dismantling the above ground storage tanks and process equipment. For further detail refer to Section V, entitled "Selected Remedy." Furthermore, reference the "Community Relations Responsiveness Summary" (Appendix A) for EPA's response to public comments.

8. State Acceptance

The State (through the Texas Water Commission) was provided an opportunity to comment on the Record of

TABLE 9

COMPARISON OF REMEDIAL ALTERNATIVES
DIXIE OIL PROCESSORS SITE

ALTERNATIVES	COMPLIES WITH ARARS	REDUCES			SHORT-TERM EFFECT	LONG-TERM EFFECT	IMPLE-MENT-ABILITY	COST THOUSND ($)	COMMUN-ITY ACCEPT	STATE ACCEPT	OVERALL PROTECT OF H&H
		TOX	MOB	VOL							
NO ACTION	0	-	-	-	0	+	+	141	-	+	0
CAP AND COVER	0	-	-	-	0	+	+	148	-	0	0
VAULT	0	-	-	-	0	+	+	148	-	0	0
ON-SITE BIOLOGICAL TREATMENT	0	-	-	-	0	+	0	148	-	0	0
ON-SITE INCINERATION	0	-	-	-	0	+	-	173	-	0	0
OFF-SITE DISPOSAL	0	-	-	-	0.	+	-	148	+	0	0

++ = Alternative greatly exceeds criteria when compared to other alternatives.
+ = Alternative exceeds criteria when compared to other alternatives.
0 = Alternative can be designed to meet the criteria.
- = Special efforts will be necessary for this criteria to meet the criteria.
-- = Compared to other alternatives, this alternative would have the most difficulty in meeting the criteria.

Decision. They had no objection to EPA's proposed alternative (See Appendix F).

Therefore, limited action and monitoring as described in the No Action alternative in the Feasibility Study was rated "+", while all other alternatives were rated "0".

9. Overall Protection of Human Health and the Environment

All alternatives rated "0" because they can all be designed to provide adequate protection from the potential risks involved with leaving low level contamination in an untreated state on the site. Additionally, this rating is based on the results of the Endangerment Assessment which under the trespass exposure scenario indicated that the site would not pose a public health threat as long as site controls are maintained (i.e., a security fence to restrict access, deed notice and restrictions, and a restriction on site activities to ensure limited exposure).

4.4 OPERATION AND MAINTENANCE

Site operation and maintenance will include a monitoring program for sampling groundwater wells, ambient air, and Mud Gully sediments. This sampling program will monitor the effectiveness of the selected remedy and provide the data necessary to trigger future corrective action, if necessary. Additional site maintenance will include, but not necessarily be limited to, inspections of surface vegetation, ensure proper drainage, and periodic fence (or barrier) repair. The details of this activity will be defined in the Operation and Maintenance Plan of the remedial design.

V. SELECTED REMEDY

Based on the information provided in the administrative record and the results of the evaluation of alternatives (Section 4.3), the final remedy has been selected.

It is EPA's judgement that limited action and monitoring as described under the No Action alternative in the Brio Refining/Dixie Oil Processors Feasibility Study Study best serves both statuatory and selection criteria in relation to the other solutions evaluated in this document.

The final remedy is summarized as follows:

Affected materials and soils - The Brio/DOP Endangerment Assessment identified action levels based on limited exposure to site contaminants. This exposure scenario relied heavily on the

use of site controls to ensure a limited probability of exposure to these contaminants. The term site controls shall be defined below, but shall include restricted access through the use of a site security fence. The endangerment assessment did not identify any contaminated soils on the DOP site that exceed the action levels discussed above. Therefore, excavation and treatment of contaminated soils is not necessary as long as the site controls are enforced. However, if proper site controls are not ensured and greater exposure results from any future activities, then the action levels identified above no longer would apply and treatment of contaminated soils may be necessary.

Surface contamination - The site investigations identified surface staining throughout the DOP property. These areas will be addressed in the site management plan discussed below.

Off-site soil contamination - Any off-site soil contamination found during the remedial investigation or during the excavation of affected materials and soils shall be removed to background levels. This may require that special detection limits be used for sampling efforts at the site boundaries during the remedial action. This activity will have to be further defined in the remedial design.

Debris and rubble - There is much inert debris and rubble remaining on the site from past operations. This material may be consolidated and the ultimate disposition of the material determined during the remedial design.

Mud Gully - Contaminants observed in this flood control ditch and the "bottle neck" that exists as it passes the Brio and DOP sites has been a noted concern of the EPA as well as local residents and the Harris County Flood Control District. It is apparent that these problems will have to be corrected as part of any remedy that is instituted at the site. Initial thoughts would suggest a low-maintenance approach to resolving this problem where some type of performance standard would be set in cooperation with the Harris County Flood Control District. Such actions shall be further defined in the remedial design.

Wastewater treatment system - The existing wastewater treatment system may be used during remedial action but will be dismantled and removed from the site by the completion of remedial action.

Storage tanks and drums - Remove tank contents, decontaminate tanks, dismantle tanks; sell or transport dismantled tanks to an EPA approved disposal facility; transport tank contents and drums to an EPA approved off-site disposal facility. If tanks are used during remedial activities, they will be dismantled upon completion.

Process equipment - The entire process facility will be dismantled to the extent that some of the existing facility may be used during remedial activities. If they are used during remedial action, the structures will be dismantled upon completion of these activities.

Monitoring and control of migration pathways - Ambient air sampling on a semi-annual basis; control air emissions from treatment processes (if necessary); excavate in enclosures (if necessary) and vent the enclosure to an emission control device; eliminate or control rainfall on construction areas; sample and monitor Mud Gully sediments; monitor the groundwater in the Numerous Sand Channel Zone and Fifty-Foot Sand for a timeframe to be defined in the remedial design; and monitoring activities will be utilized to determine the effectiveness of the actions to be implemented and shall be detailed in the operation and maintenance plan of the remedial design. This same data will be evaluated during the Agency's 5-year review, in accordance with SARA Section 121(c), to determine if any corrective action is necessary.

Site management plan - The entire DOP site will be regraded and vegetated to promote drainage and minimize infiltration. All regraded areas will be covered with 6 inches of topsoil, if necessary, to promote vegetative growth. To the maximum extent practicable, the aesthetics of the site (upon completion of the remedy) shall be enhanced by utilizing creative design and landscaping techniques with input from the local residents.

Site control - This remedial action is based on permanent site control, imposition of necessary deed notices and restrictions (if possible), and restriction of access to the site by use of a fence or similar barrier.

Estimated Cost - The estimated cost of the remedy is $241,000.

APPENDIX A

DIXIE OIL PROCESSORS SITE
SOUTHEAST HARRIS COUNTY, TEXAS
RESPONSIVENESS SUMMARY

This community relations responsiveness summary is divided into two sections:

SECTION I: BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERN

This section provides a brief history of community interest and concern raised during the planning activities at the Dixie Oil Processors Superfund site.

Section II: SUMMARY OF MAJOR COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND THE EPA'S RESPONSE TO THE COMMENTS

Both written and oral comments are presented. EPA's responses to these relevant topics are also presented.

I. BACKGROUND ON COMMUNITY INVOLVEMENT

Dixie Oil Processors (DOP) was referred to EPA in 1985 by the Texas Water Commission for inclusion to the National Priorities List. Due to its location next to the Brio Refining site, its past history with the site and the fact that many of the same PRPs at Brio were potentially involved at DOP, the Brio Administrative Order on Consent was amended on April 23, 1986, to include the DOP site. This agreement between EPA and the Brio Site Task Force provided for investigations at the DOP site and for the Task Force to conduct a comprehensive community relations program on DOP with EPA oversight.

On September 4, 1986, a community meeting was held to discuss any issues or concerns the local residents may have regarding the site studies. Status reports were also provided through newsletters.

On February 2, 1987, the Task Force held a community meeting on various treatment techniques that may be employed during remedial action at a typical Superfund site. A community leaders meeting was held on April 2, 1987, to provide an update on site activities. A meeting to discuss the preliminary results of the Endangerment Assessment was held with the community leaders on June 18, 1987.

On January 21, 1988, EPA announced through a press release that studies were completed on the DOP site. The announcement also advised the public that EPA would be accepting comments on the proposed remedy for the site from February 1 to March 1, 1988, and that the Agency would hold a public meeting on February 9, 1988. An EPA prepared fact sheet describing various alternatives evaluated was mailed to interested citizens. EPA held a

community leaders meeting on January 25, 1988, to brief the members of the group on the solutions proposed for the site. On the following night, January 26, 1988, the Brio Site Task Force held a community meeting to discuss the overall results of the site investigations, the findings of the Endangerment Assessment. An EPA representative announced the scheduled public meeting to discuss remedial alternatives. EPA's public meeting was held on February 9, 1988, at the Weber Elementary School. Approximately 350 people attended the meeting. The community expressed great concern that the remedial action would only address partial remediation. A summary of the public response to the solutions proposed by EPA at this meeting, can be found in the Responsiveness Summary (Appendix A). On February 22, EPA met with the Friendswood City Council to discuss the proposed alternative solutions that the Agency had outlined in its public meeting on February 9.

Again, It should be noted that EPA was an active participant in all of the community or community leaders meetings discussed above. These activities were carried-out in cooperation with the Brio Site Task Force in accordance with the terms outlined in the above mentioned Brio Refining/Dixie Oil Processors Administrative Order on Consent.

II. SUMMARY OF PUBLIC COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

The public comment period on the Feasibility Study for the Dixie Oil Processors Superfund site opened on February 1, 1988 and closed on March 1, 1988. A public meeting was held February 9, 1988, at the Weber Elementary School with approximately 350 people in attendance. The EPA received many comments regarding all aspects of the Superfund actions taken at this site. This Responsiveness Summary is written to summarize the publics response to EPA's proposal for remediation at the Brio Refining and Dixie Oil Processors sites. Therefore, the Agency has focused its attention on summarizing and responding only comments concerning the Brio Refining and Dixie Oil Processors Feasibility Study and the remedial alternatives being evaluated. This summary is provided below:

Comment 1

EPA misrepresented what was meant by "cleanup" of the site (i.e., partial versus complete treatment).

EPA Response to Comment 1

The EPA agrees that, in general, the term "cleanup" is misused in certain situations. However, the Agency's representatives for this particular site have been very careful as to not mislead the local residents during the many public meetings that have been held throughout the past few years. Experience has shown us that

very few sites are ever returned to a naturally "clean" state; therefore, we are very careful about the message that we communicate to the public. It is our opinion that this misconception is a result of the publics own belief that an eventual remedial action would mean treating all measurable amounts of contaminated materials and soils enabling the site to be used for commercial or recreational purposes.

Comment 2

The proposed remedy does not provide maximum health protection to nearby residences, schools, and hospitals.

EPA Response to Comment 2

It is EPA's opinion that the proposed remedy provides what EPA considers to be adequate protection of human health and the environment. This message is discussed in great detail in the Brio Refining and Dixie Oil Processors Endangerment Assessment. This document provided EPA with the information necessary to make this determination. Additionally, the calculations made in the assessment are very conservative thus providing the Agency with added certainty for protection of public health.

EPA has proposed to excavate and treat all affected materials and soils that have a potential for creating an unacceptable risk to human health or the environment. Once this activity is completed, site controls will be enforced to restrict access to the site thus reducing the probability of exposure to any low level contaminants that may remain upon completion of remediation.

Comment 3

The deed restrictions and restricted access associated with the proposed remedy will promote a negative perception of the community and will adversely affect property values.

EPA Response to Comment 3

EPA in conducting its environmental mandate, must balance a large number of factors before determining the best approach to addressing problems at Superfund sites. The Superfund Amendments and Reauthorization Act (SARA) specifies that EPA shall "... select a remedial action that is protective of human health and the environment ..." The statute also states that EPA shall "... select appropriate remedial actions determined to be necessary to be carried out ... which provide for cost-effective response." These laws are developed by our governmental leaders and EPA must use them as a guide in conducting its business.

EPA believes that the proposed plan of action at the Brio and Dixie Oil Processors (DOP) sites comply to the maximum extent

practicable, with the provisions of SARA. The first priority of the Agency is the protection of human health and the environment and the proposed solutions serve this purpose very well. An increased degree of treatment at either site would result in very little added protection relative to the incremental increase in cost that would result. Furthermore, the appearance of the sites upon completion of the remedial action is a consideration of the final Record of Decision. Appearance will also be a factor in all discussions on conducting and funding of remedial actions by potentially responsible parties. It is believed that the parties will be interested in investigating, in concert with local homeowners, various creative landscaping ideas that will result in an acceptable solution.

Implementing solutions which account for local property values and economic development is outside the jurisdiction of EPA. Local residents have the State courts available to them to resolve these issues or they can request that their State government intervene on their behalf. State governments have the opportunity to request for and pay the additional costs attributed to meeting any such standard they may deem necessary. This would include a request for treating all measurable quantities of waste at a Superfund site. Additionally, the State would then become a signatory to the Consent Decree and actively participate in negotiations, the remedial design, and remedial action.

Comment 4

Bioremediation should be evaluated further as a potential remedy at the site.

EPA Response to Comment 4

It is EPA's judgment that on-site incineration of wastes would best serve both statutory and selection criteria in relation to the other solutions evaluated. On the other hand, the Brio Site Task Force has proposed the use of on-site aqueous-phase biological treatment. The EPA had some concerns over the lack of demonstrated performance of this technique on the wastes at the site. However, this will not prevent EPA from favorably considering the proposal of the Task Force if they can demonstrate that biological treatment can provide the same level of treatment deemed necessary by the Agency. Pass/fail criteria for use of biological treatment rather than incineration will be developed prior to the start of remedial action. If biological treatment cannot meet the pass/fail criteria, then on-site incineration will be implemented.

Comment 5

On-site incineration is not a practical alternative given the

Based on the public response to this situation, as part of any remedy, all storage tanks, surface vessels, drums, and process equipment will be dismantled and either sold (after proper decontamination) or disposed according to EPA regulations.

Comment 9

The ash from the incinerator is going to be harmful to our health.

EPA Response to Comment 9

If incineration is used for treatment of affected materials and soils all of the ash resulting from the thermal treatment operations will have to pass specific tests before it would be allowed to be placed back into the ground. These tests will provide EPA with the confidence that this material will not result in a future problem. Additionally, this material will remain onsite and site access will be restricted.

Additionally, our incineration tests showed us that we could achieve a 99.997% reduction in contaminants. . These results suggest that minimal amounts of contamination, if any, will remain after treatment.

Comment 10

Identify the methods of control for odors in the incineration process.

EPA Response to Comment 10

The most likely cause of odors during the remedial action would result from volatile contaminants being released during excavation activities. As outlined in the Brio Refining and Dixie Oil Processors Feasibility Study, all excavations (during the construction of the solution) will be performed in portable enclosures. The enclosures will trap the volatile compounds. The air in the enclosures will then be treated to remove these compounds. This practice should reduce, to the maximum extent practicable, any odors resulting from soil disturbance activities.

Comment 11

Describe the regulations and standards that will be in place after the cleanup is completed that will ensure the protection of the publics health and safety.

EPA Response to Comment 11

This remedial action is based on permanent site controls. This

will include the imposition of deed notices and restrictions to ensure that the site is never used in such a way as to increase exposure to contaminants that will remain on site and a security fence or similar barrier will be maintained to prevent trespass and potential exposure to contaminants left onsite.

In addition to these activities, the ambient air, groundwater and Mud Gully sediments will be sampled and monitored to provide information for evaluation of the effectiveness of the solution. This program will be conducted indefinitely or until such time that EPA feels that such efforts are no longer necessary. Also any remedial action where EPA leaves contaminants at the site (upon completion of the remedy), the Agency must review such actions no less than five years after the initiation of such remedial action to assure that human health and the environment are being protected.

Comment 12

In screening the remedial alternatives, the offsite disposal option was quickly dismissed in the Feasibility Study. This conclusion is not reached in a logical and well documented manner.

EPA Response to Comment 12

The Superfund law, specifically SARA Section 121 (b) state that "... offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available ... shall conduct an assessment of permanent solutions and alternative technologies ... that, in whole or in part, will result in a permanent and significant decrease in toxicity, mobility, or volume of hazardous substances dismissal of Offsite Disposal as a viable alternative.

Comment 13

It was suggested that the estimates in the Feasibility Study for waste volumes of the on-site pits were ball-park figures; heavily contaminated areas could have been missed by soil borings; the shallow groundwater contamination was not well defined; and the cost analysis lacked sufficient support.

EPA Response to Comment 13

The EPA feels that the field work conducted as part of the Remedial Investigation and Supplemental Investigation was more than sufficient to characterize the magnitude and extent of contamination. This effort will be further refined during the actual remedial action where all contaminated sludges and liquids will be excavated and treated. The Feasibility Study identified pits B, J, Q, R, H/V, and E as needing remediation based on the

findings of the Endangerment Assessment. As part of the Record of Decision pits F, G, I, K, L, and M will require examination during remedial action for removal of all sludges and liquids. Additionally, all surface contamination (in the form of tars) will be scraped and consolidated for treatment. Regarding the comment on cost estimates, the Feasibility Study contained sufficient information to evaluate each conceptual design.

Comment 14

Some comments were received concerning the question of off-site contamination which originated from the Brio Refining site.

EPA Response to Comment 14

This information has been turned over to EPA's Site Assessment section for further investigation. Those individuals who have commented in this fashion will be contacted by this group following their evaluation of the matter.

Comment 15

Explain what pits will be excavated.

EPA Response to Comment 15

See EPA's response to Comment #13.

APPENDIX B

TABLE 3-1

VESSEL SUMMARY
DIXIE OIL PROCESSORS

Vessel Number	Service	Calculated Capacity (gals)	Contents Estimated Volume (gals)	Contents Description
BT-1	Product Storage	151,137	29,400	Solid, Sludge
BT-2	Feed Tank	98,805	8,500	Sludge
BT-3	Unknown	98,805	4,900	Organic liquids and sludge
BT-4	Brio Process	31,056	~7,800	Contaminated water
BT-4A	Product Storage	15,493	780	Sludge
BT-5	Vent for R-8	27,170	3,500	Sludge
BT-6	Light Ends Storage	15,493	280	Sludge
BT-7	Light Ends Storage	27,170	Unknown	Sludge
BT-8	Light Ends Storage	27,170	~4,000	Organic liquids and sludge
BT-9	Light Ends Storage	11,693	830	Thick polymer
BT-10	Feed Tank	88,128	920	Sludge
BT-11	Feed Tank	33,600	~11,000	Sludge
BT-12	Feed Tank	41,125	590	Sludge
BT-13	Product Storage	24,306	810	Sludge, organic liquid
BT-14	Never used by DOP	13,649	~6,000	Sludge
R-4	Copolymer Receiver	16,204	~16,000	Hard tar material
R-5	Still Pot	93,200	3,110	Sludge
R-8	Received Cresylic Acid	93,200	~20,000	Organic liquids and sludge
V-100	Light Ends Receiver	19,518	980	Sludge, organic liquid
	Totals	926,922	118,420	

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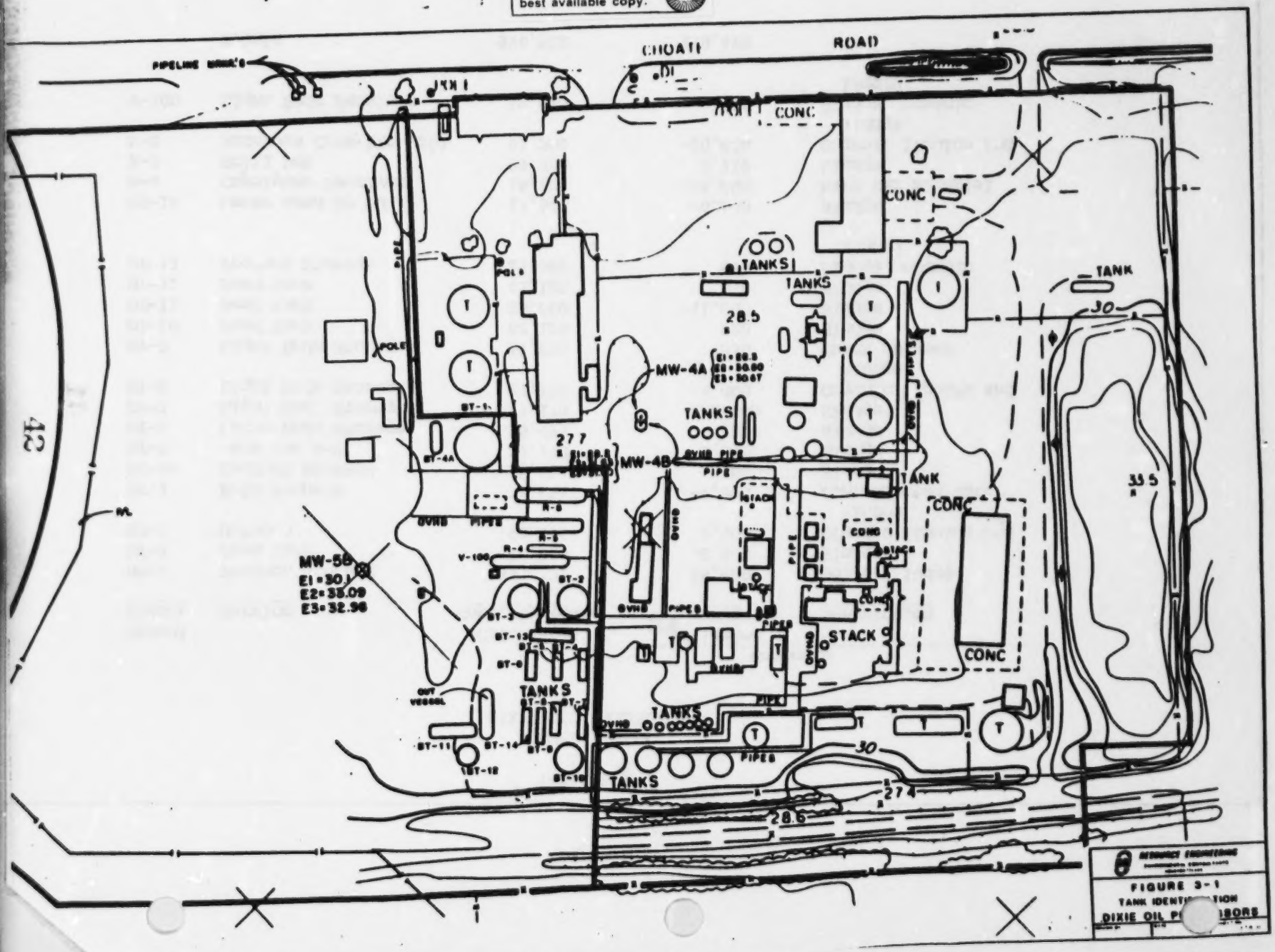

TABLE 3-9

RI GENERATED WASTES
DRUM INVENTORY

Origin	Clothing	Drilling Fluid	Drill Cuttings	Monitor Well Water	Total
DMW-5A	4	32	2	0	38
DMW-19A	2	24	5	3	34
DMW-19B	1	36	0	3	40
DMW-20A	3	8	1	3	15
DMW-20B	6	80	3	7	96
DMW-21A	0	3	0	4	7
DMW-22A	1	26	0	2	29
DMW-23A	0	5	4	3	12
DMW-24A	1	22	0	0	23
DMW-24B	2	38	1	12	53
DMW-25A	0	20	1	4	25
DMW-27A	2	14	1	0	17
DMW-28B	0	45	0	0	45
Dixie Totals	22	353	18	41	434

DRUM LOCATIONS

Storage Location	# of Drums	Palletized
Storage Areas on Brio	235	Yes
On-Site Dixie	199	No
Total Drums	434	

APPENDIX C

4.7 REGULATORY COMPLIANCE

4.7.1 General Background

Section 121(d) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), describes the types of standards that a remedial action is required to meet. Those standards must be met by any remedial action proposed by this Feasibility Study for the Brio site. Section 121(d) mandates that the remedial action selected must be protective of public health and the environment and the types of control in place and the levels of the hazardous substances, pollutants, or contaminants at the site must meet those standards, requirements, criteria, or limitations under any Federal environmental law, or any more stringent state standard, that are "legally applicable" or "relevant and appropriate". To obtain compliance with this general standard, and in recognition of the USEPA's July 9, 1987 memorandum "Interim Guidance on Compliance with Applicable and Relevant and Appropriate Requirements", all remedial action plans were evaluated to determine what standard and appropriate technologies would be adequately protective of public health and the environment.

The universe of environmental standards and controls was reviewed to determine which of them had a bearing on remedial action at the site, Table 4-8. The results of that evaluation are summarized in Table 4-9 which specifies controls and standards deemed appropriate during remediation on the basis of a best engineering judgement evaluation.

At the completion of remediation the only standards that must be complied with are those that describe the level at which a hazardous substance, pollutant or contaminant should be found in the environment or those standards that specify a means of controlling releases of hazardous substances, pollutants or contaminants.

For those standards that describe a level or type of control, these requirements need only be met if they are "legally applicable" or "relevant and appropriate". These terms are not defined in the amended CERCLA. The EPA's Interim Guidance defines "applicable requirements" as "those cleanup standards, standards of control, and other substantive environmental

TABLE 4-8

STANDARDS, REQUIREMENTS, CRITERIA, OR LIMITATIONS EVALUATED FOR ARARs DETERMINATION

- Safe Drinking Water Act
- Clean Water Act
- Solid Waste Disposal Act
- Occupational Safety and Health Act
- Hazardous Materials Transportation Act
- National Historic Preservation Act
- Archeological and Historical Preservation Act
- Historic Sites, Buildings and Antiquities Act
- Fish and Wildlife Coordination Act
- Endangered Species Act
- Rivers and Harbors Act of 1899
- Wilderness Act
- Scenic River Act
- Coastal Zone Management Act
- Texas Clean Air Act
- Texas Solid Waste Disposal Act
- Texas Water Code

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TABLE 4-9

STANDARDS AND CONTROL TECHNOLOGY
UTILIZED DURING REMEDIATION AS
SPECIFIED BY BEST ENGINEERING
JUDGEMENT TO PROTECT PUBLIC HEALTH
AND THE ENVIRONMENT

A. AIR EMISSIONS

1. Excavation/stabilization performed in enclosure and air emissions collected and routed to fume incinerator with scrubber (all remedial options).

2. Any stockpiles of feedstock for treatment (biological or incineration) maintained in enclosure with air emissions collected and routed to scrubber equipped fume incinerator.

3. Biological treatment (solid or aqueous) performed in an enclosure with air emissions collected and routed to a scrubber equipped fume incinerator.

4. Incinerator equipped with high-temperature secondary combustion chamber and wet scrubber designed to meet particulate, HCl and destruction removal efficiency limitations specified in 40 CFR Part 264, Subpart O.

B. SURFACE AND GROUNDWATER

1. Process water and potentially contaminated stormwater[1] collected and routed to a package activated sludge treatment system equipped with carbon polishing and discharged to Mud Gully or routed to a POTW for treatment (all remedial options).

2. Discharge from package treatment system consistent with NPDES permit limitations, and 40 CFR Part 125.

3. Any groundwater subject to treatment would be treated in the package treatment system prior to discharge.

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1 Since excavation/stabilization, stockpiling and any treatment will take place in enclosures such that potentially contaminated stormwater would not be generated, the only areas subject to stormwater collection would be the transfer areas between pit excavation and stockpile and stockpile and treatment.

TABLE 4-9
(Continued)

C. AFFECTED SOIL AND MATERIAL

1. Compliance with substantive portions of 40 CFR Part 264, Subpart J, relating to tanks (aqueous biological treatment), including:

   a. 40 CFR § 264.191 (shell strength)
   b. 40 CFR § 264.192 (prevent overfilling)

2. Compliance with substantive portions of 40 CFR Part 264, Subpart L, relating to covered storage piles (all remedial options), including:

   a. 40 CFR § 264.250(c) (covered waste pile)

3. Compliance with substantive portions of 40 CFR Part 264, Subpart M, relating to land treatment (solid phase biodegradation), including:

   a. 40 CFR § 264.273 (maximize degradation)
   b. 40 CFR § 264.278 (unsaturated zone monitoring)

D. GENERAL

1. OSHA Health and Safety Regulations as provided for in 20 CFR Part 1910, Subpart H.

protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site." The guidance also notes that to be "applicable" implies that the remedial action or circumstance satisfy all the jurisdictional prerequisites of a requirement.

The Interim Guidance defines "relevant and appropriate" requirements as "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal and State law that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site."

Section 121 also provides that on-site remedies are not required to obtain Federal, State, or local permits. This permit exemption covers Federal, State or potentially responsible party response actions being taken on site under the authority of CERCLA Sections 104, 106 or 122. Therefore, these remedies must comply with the substantive requirements which specify a level or means of control, but do not need to comply with administrative and procedural requirements associated with the permitting process. "On-site" includes the areal extent of contamination and all suitable areas in reasonable proximity to the contamination necessary for implementation of the response action.

ARARs must be determined on a site specific basis. Therefore, with this general understanding of the requirements of § 121(d), the following is an assessment by environmental media of compliance of the proposed remedial actions with the standards found to be either "legally applicable" or "relevant and appropriate".

4.7.2 Air Emissions

Based on a review of all potentially applicable air emission-related regulations and standards, the only "legally applicable or relevant and appropriate requirement" for air emissions at the completion of remediation is

specified in Section 4.01 of the Texas Clean Air Act, which provides that "no person may cause, suffer, allow or permit the emission of air contaminants or the performance of any activity which causes or contributes to, or which will cause or contribute to, a condition of air pollution". "Air pollution" is defined "as the presence in the atmosphere of one or more air contaminants or a combination thereof, in such concentration and of such duration as are of may tend to be injurious to or to adversely affect human health or the environment, animal life, vegetation or property, or as to interfere with the normal use and enjoyment of animal life, vegetation, or property."

To assure compliance with this standard, each of the proposed remedial action plans contains provisions for semiannual ambient monitoring to verify that site conditions existing at the completion of remediation are not causing or contributing to a condition of air pollution. All of the remedial actions are designed to insure that emissions are in compliance this ARAR. Specific measures to control air emissions during remediation have been incorporated into each remedial action plan and are outlined in Table 4-9.

4.7.3 Surface and Ground Water

4.7.3.1 Discharges to Surface Water

Mud Gully runs through the site and will be impacted from both point and non-point sources of water discharges from the site. The point sources will consist of water generated by remedial activities as well as storm water flows. At the completion of remediation, there will be no point source discharge.

However, at the completion of remediation Mud Gully may be impacted by a non-point source discharge, namely ground water flow from the NSCZ. The only standards that could be "legally applicable or relevant and appropriate" to discharges from the NSCZ would be state water quality standards or federal water quality criteria.

State water quality standards are the legally enforceable counterpart to federal water quality criteria. In Texas, the state water quality standards are set forth in Chapters 319 and 333, of the rules and regulations of the

Texas Water Commission. Those standards establish certain numerical criteria which are legally applicable to Mud Gully. All remedial action plans satisfy the requirements of 31 TAC §§319.21 - 29, 333.17 - .19 for the discharge of water from the NSCZ to Mud Gully.

While these requirements are ARARs, those portions of the state's standards and the federal water quality criteria that relate to use of surface waters as a source of drinking water (because the surface water directly supplies water to a public drinking water supply system or recharges an aquifer used for that purpose) are not applicable or relevant and appropriate, because Mud Gully does not supply water to a potable water supply system nor does it recharge an aquifer used for that purpose.

4.7.3.2 Ground Water

The EPA's ground water protection strategy is based on the "differential protection" of ground water (i.e., ground water protection as it relates to a specific classification of an aquifer). Under the strategy ground waters are classified as follows:

- Class I - ground waters that are highly vulnerable and either an irreplaceable source of drinking water or ecologically vital;
- Class II - ground water currently used or potentially available for drinking water or other beneficial use; and
- Class III - ground waters are not a potential source of drinking water and of limited beneficial use.

For Class I and Class II ground waters MCLs established under The Safe Drinking Water Act would be applicable for ground water which qualifies as a public water system or a community water system. MCLs may also be relevant and appropriate to ground water that would not currently qualify as such systems but could potential so qualify in the future. Similarly, where the State has established drinking water standards are more stringent than the Federal MCL, these may be applicable or relevant and appropriate.

There are two water-bearing zones underlying the site which appear to have been impacted by on-site activities. The uppermost zone is the NSCZ. The next zone, which is separated from the NSCZ by an aquitard referred to as the Middle Clay Unit, is the Fifty-Foot Sand. As discussed in this FS, the NSCZ is neither an existing nor potential drinking water supply because of the poor yield of that zone and therefore is a Class III aquifer under the EPA Groundwater Protection Strategy. As such MCLs are neither applicable nor are they relevant and appropriate to the NSCZ. As outlined above, however, NSCZ ground water quality will be maintained such that its discharge does not represent a threat to aquatic life in Mud Gully.

While the Fifty-Foot Sand might be a "potential" drinking water source, demographic data, land use, and projected water supply plans for the area clearly indicate that this aquifer is not likely to be used for drinking water supply purposes.

Even if it is used as a drinking water supply it is not likely to serve as a public water system or even a community water system. Therefore, MCLs would not be legally applicable to the Fifty-Foot sand. However, because of its status as a potential drinking water source these standards may be considered relevant. Given that any potential use is unlikely in the near future, and indeed may never occur, immediate application of MCL is not appropriate. Instead, it is more appropriate to monitor this zone and let natural attenuation, which will eventually allow any affected ground water in the Fifty-Foot Sand to achieve MCL levels, take its course since there is not current or projected threat of exposure. Furthermore, any subsequent application of MCLs would apply to concentrations at the point of use and not at the source.

4.7.4 Affected Material and Soils

The primary standards of criteria that could be legally applicable to the storage, treatment or disposal of affected material and soils are those developed under the authority of RCRA. RCRA requirements would be "legally applicable" to "hazardous waste" which includes: (1) wastes which exhibit one of four characteristics (ignitability, reactivity, corrosivity, or toxicity) or (2) are listed in the RCRA regulations as hazardous waste or (3) are

mixtures of solid waste and hazardous waste that are not subject to an exclusion from regulation. In order for these RCRA requirements to be legally applicable at a CERCLA site the waste must be: (1) RCRA characteristic or listed hazardous waste; and (2) have been received after November 19, 1980; or the CERCLA activity at the site constitutes current treatment, storage, or disposal as defined under RCRA.

Applying this test, the first portion is clearly not satisfied since all of the material to be dealt with during remediation was received at the site prior to November 19, 1980. Therefore, the RCRA requirements would not be legally applicable on that basis. The remaining portion of the test concerns whether the proposed remedial actions would constitute storage, treatment or disposal. No storage, as defined under RCRA, is proposed. Further, no treatment will exist at the completion of remediation. With regard to disposal, movement of material deposited before November 19, 1980 may constitute disposal where the material is moved from within a "unit area of contamination" and placed in another area outside the "unit area of contamination." In the case of Brio/DOP, all proposed excavation and treatment would be conducted within the unit area of contamination and thus, disposal as defined in RCRA will not occur. No element of the second portion of the test is satisfied and, consequently, the RCRA requirements are not legally applicable.

Even though they are not legally applicable, certain RCRA requirements, including the RCRA design and operating standards, may be considered relevant and appropriate based on the fact that they address problems or situations sufficiently similar to those encountered at the Brio/DOP sites. Table 4-10, in addition to specifying other ARARs, lists those RCRA requirements deemed relevant and appropriate to the various remedial actions analyzed in this FS. These requirements are considered ARARs.

For example, in two of the remedial action plans, cap and cover and vault, affected material and soils would be remediated on site in accordance with the closure requirements applicable to surface impoundments and landfills, respectively. These closure requirements are relevant and appropriate to the remedial action technologies contained within these two remedial action plans.

TABLE 4-10

BRIO/DOP APPLICABLE OR
RELEVANT AND APPROPRIATE REQUIREMENTS

1. Section 4.01 of Texas Clean Air Act (applicable).

2. Sections 329.41-.49, 333.17-.19 of Chapter 31 of Texas Administrative Code Relating to State Water Quality Standards as applied to Mud Gully (applicable).

3. Federal Water Quality Criteria for Fresh Water Aquatic Life Protection as applied to Mud Gully (relevant and appropriate).

4. Safe Drinking Water Act Primary and Secondary Maximum Contaminant Levels (MCLs) as applied to Fifty-Foot Sand (relevant and appropriate).

5. RCRA requirements contained in 40 CFR, Part 264, consisting of the following (by remedial action plan) (relevant and appropriate).

   a. Cap and Cover (40 CFR Part 264, Subpart N)

      (1) Eliminate Free Liquids.

      (2) Stabilize to a bearing capacity sufficient to support final cover.

      (3) Cover designed to:

         (a) provide long term minimization of migration of liquids through closed area;

         (b) function with minimum maintenance;

         (c) promote drainage and minimize erosion;

         (d) accommodate settling and subsidence so that cover integrity maintained; and

         (e) have a permeability less than or equal to permeability of any bottom liner system or natural subsoil.

      (4) Post-Closure Designed to:

         (a) maintain integrity and effectiveness of cover;

         (b) maintain groundwater monitoring system;

TABLE 4-10
(Continued)

(c) prevent run-on and run-off from eroding or otherwise damaging final cover; and

(d) prevent disturbance of cover.

b. Vault (40 CFR Part 264, Subpart N)

(1) Constructed with two liners and a leachate collection system.

(2) Lower liner at least 3 feet thick constructed of recompacted clay with a permeability of no more than 1×10^{-7} cm/s.

(3) Maintain a run-on control system to prevent flow into active portion of landfill.

(4) Maintain a run-off control system to collect and control water volume from active portions resulting from a 24-hour, 100 year storm.

(5) Manage wind dispersal of particulates.

(6) Stabilize materials sufficiently such that no free liquids are placed into vault.

(7) Cap construction consistent with 5a, above.

(8) Post-closure consistent with 5a, above.

6. RCRA requirements contained in 40 CFR Parts 262 and 263 to the extent that a remedial alternative involves off-site transportation of materials (applicable). Additionally, 49 CFR Parts 107, 174-177 relating to Hazardous Materials Transportation would be applicable.

7. RCRA requirements contained in 40 CFR Part 264, Subpart B, related to general facility standards (applicable), consisting of:

a. 40 CFR § 264.14 (site security).

b. 40 CFR § 264.17 (incompatible waste).

8. RCRA requirements contained in 40 CFR Part 265, Subpart G (relevant and appropriate), consisting of:

a. 40 CFR § 264.114 (equipment decontamination).

b. 40 CFR § 264.117 (monitoring).

9. Executive Order 11988 - Flood Plain Management

Additionally, all remedial action plans that involve the off site transport for disposal would be managed in a manner consistent with 40 CFR Part 262, including disposal at a RCRA approved facility.

4.7.5 Land Ban Requirements

Waste banned pursuant to the Hazardous and Solid Waste Amendments of 1984 (HSWA) cannot be placed in or on the land unless they have been first treated to levels achieving by best demonstrated available technology (BDAT) for each hazardous constituent in the waste. "Placement" triggers the land disposal requirements and this only occurs when disposal occurs. Therefore, for placement to occur, hazardous waste must be picked-up and moved across the boundary of RCRA "unit area of contamination". Applying this definition to the Brio/DOP sites, it is clear that "placement" does not occur when waste is consolidated within an area of contamination, capped in place (including grading prior to capping) or treated in-situ.

Therefore, since the Brio/DOP sites are each considered an "area of contamination", for the reasons discussed above, "placement" does not occur during any of the proposed remedial actions. Therefore, the land disposal requirement is not "applicable" nor is it considered "relevant and appropriate".

4.8 SUMMARY OF DETAILED ANALYSIS

4.8.1 Introduction

At this stage, remedial investigations and endangerment assessment of the Brio/DOP site have been completed. Utilizing data developed in the RI and SRI, the EA concluded that existing conditions at the Brio/DOP site do not in and of themselves represent unacceptable risks to public health and the environment. The EA further concluded that exposure scenarios reflecting reasonably anticipated future changes to site conditions can be developed which, were they to occur, would result in unacceptable risks to human health and the environment. The identified areas containing materials that exceed the cleanup levels developed in the EA include materials and soils in Pits B, E, J, Q and H/V. The exposures of concern include long term inhalation of volatilized compound from these areas or direct ingestion of these affected soils and materials.

To remediate these affected areas, four surviving remedial action plans were refined in the beginning of this chapter (Section 4.3). Each plan was then evaluated in relation to its technical feasibility (Section 4.4), effectiveness in achieving health and environmental goals (Section 4.5), cost (Section 4.6) and regulatory compliance (Section 4.7). The purpose of this section is to summarize the results of these earlier analyses.

4.8.2 Cap and Cover

- Technical Evaluation - Stabilization followed by cap and cover is a feasible and commonly practiced remedial approach. It is applicable, practical and proven. Some long term monitoring and maintenance of cap conditions would be required.

- Public Health/Environmental Evaluation - Stabilization, cap and cover and venting will isolate affected soils from human contact. Cap and cover in combination with the site management plan will minimize the potential for migration via infiltration or runoff. Cap and cover in combination with long term venting system will eliminate potential air emissions.

- Regulatory Compliance - Cap and cover complies with all legally applicable or relevant and appropriate federal and state standards, requirements, criteria or limitations.

- Cost - Total cost of cap and cover is $13,481,000. Net present cost of cap and cover is $11,700,000. Cap and cover is the most cost effective remedial action plan.

4.8.3 Vault

- Technical Evaluation - The vault is a feasible and readily constructable remedial approach. Equipment manpower and materials for vault construction are readily available. Some uncertainty regarding the effectiveness of stabilization remains. Some long-term maintenance would be required.

- Public Health/Environmental Evaluation -Stabilization and vaulting of affected soils and materials will isolate the materials from direct human contact. Vault construction in combination with the site management plan will minimize the potential for migration via infiltration or runoff. The secure cap and cover installed on the vault will eliminate potential air emissions.

- Regulatory Compliance - Stabilization and vaulting of affected soils and materials complies with all legally applicable or relevant and appropriate federal and state standards, requirements, criteria or limitations.

- Cost - Total vault costs are $20,871,000. Net present costs of the vault are $17,300,000.

4.8.4 Biological Treatment

- Technical Evaluation - Biological destruction of organic compounds is applicable, practical, and proven. Field testing on site specific materials has yielded further positive results for degradation of PNAs and removal of volatiles. Basic process configurations (solid or aqueous phase) are easily constructable and implementable.

- Public Health/Environmental Evaluation - Biological treatment of affected soils and materials will significantly reduce constituent concentrations for both PNAs and volatiles. This destructive technology will result in the production of soils that can be backfilled to the pit areas with no need for further treatment effectively eliminating the ingestion and runoff issues. Cap and cover on other site areas will further isolate materials from potential contact or transport.

- Regulatory Compliance - Biological treatment complies with all legally applicable or relevant and appropriate federal and state standards, requirements, criteria or limitations. Further substantial reductions in

mobility, toxicity and volume of affected soils and materials are achieved.

- Cost - Total costs for biological treatment are $22,956,000 (aqueous phase) and $22,981,000 (solid phase). Net present costs are $19,920,000 (aqueous phase) and $19,930,000 (solid phase).

4.8.5 Incineration

- Technical Evaluation - Destruction of organic compounds through incineration is applicable and a proven technology for remediation of affected soils and materials. Field testing of high temperature incineration on site specific soils indicated successful destruction of organic constituents. Mobile/transportable incinerators are available from various vendors. Application of incineration, however, will be more complex than other alternatives.

- Public Health/Environmental Evaluation - Incineration will eliminate potential public health/environmental impacts by elimination of organic compounds in affected soils and materials. Air emissions would be controlled with conventional scrubber technology. Constituent destruction eliminates future concerns regarding ingestion, inhalation and off site transport. Cap and cover on other site areas will further isolate materials on site from potential contact or transport.

- Regulatory Compliance - Incineration complies with all legally applicable or relevant and appropriate federal and state standards, requirements, criteria or limitations. Further, substantial reductions in mobility, toxicity and volume of affected soils and materials are achieved.

- Cost - Total costs for incineration are $22,271,000 (Rotary Kiln) and $22,131,000 (Infrared). Net present costs are $21,780,000 (Rotary Kiln) and $17,540,000 (Infrared).

4.8.6 Comparative Evaluation

All remedial action plans are technically implementable and constructable. Both aqueous phase and solid phase biological treatment systems will be more complex to implement than the containment options (cap and cover and vault) because of the fact that complete modular units are not available. However,

the process itself is not complex. All technologies are field-proven although certainty concerning performance is variable.

All remedial action plans achieve compliance with the specified remedial objectives. The containment options isolate affected materials and soils from human contact. While subject to prior stabilization, affected soils and materials remain on site in the cap and cover and vault alternatives. The treatment alternatives (biological and incineration) reduce or destroy organic constituents down to trace levels to the extent that future concerns regarding inhalation, ingestion or off site transport are eliminated.

All remedial action plans achieve compliance will all legally applicable or relevant and appropriate federal and state standards, requirements, criteria or limitations. Both treatment options achieve an additional reduction in mobility, toxicity and volume of affected soils and materials.

Cap and cover is the most cost effective containment options. The treatment option costs are essentially equivalent given the accuracy of the cost estimation.

Table 4-11 summarizes this comparison of alternatives.

APPENDIX D

administrative Record not included

APPENDIX E

RIMCO DISMANTLING

1331 Lamar, Suite 1459
Houston, Texas 77010
713/739-0388

August 2, 1985

Brio Task Force
D. E. Ganschinietz
c/o Monsanto Company
P. O. Box 711
Alvin, Texas 77511

Gentlemen:

The following costs are for the cleaning and dismantling of the Brio Refinery Inc. site as requested by Mr. Donald E. Ganschinietz:

1A. $90,000.00 Flushing and Steam Cleaning Refinery Area.

1B. $220,000.00 Dismantle Refinery Area.

2A. $40,000.00 Flushing and Steam Cleaning Dixie Chemical Area.

2B. $60,000.00 Dismantle Dixie Chemical Area.

3. $50,000.00 Dismantle Site Building.

4. $38,000.00 All Other Equipment On Site.

5. $150,000.00 Remove All Concrete.

6. Revenue Sharing Plan — 70% for Contractor
30% for Brio Task Force

7. Decontamination Work: — Cost Plus
10% Overhead
20% Profit

Thank you for the opportunity to estimate this work.

Very truly yours,

J. R. Brown

JRB:ah

APPENDIX F

REGION VI
HAZARDOUS WASTE MGMT. DIV.

TEXAS WATER COMMISSION

Paul Hopkins, Chairman
John O. Houchins, Commissioner
B. J. Wynne, III, Commissioner

J. D. Head, General Counsel
Michael E. Field, Chief Examiner
Karen A. Phillips, Chief Clerk

Allen Beinke, Executive Director

March 29, 1988

Allyn M. Davis, Ph.D., Director
Hazardous Waste Management Division
U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: Dixie Oil Processors Site
Draft Record of Decision

Dear Dr. Davis:

We have reviewed the proposed Record of Decision (ROD) for the Dixie Oil Processors Site. We have no objection to the selected remedy as described in the draft ROD of March 21, 1988. The selected remedy requires a limited action/monitoring remedy as described under the "no action" alternative.

Sincerely,

Allen Beinke

Allen P. Beinke
Executive Director